

PERFORMANCE ANALYSIS OF DOCSIS STANDARD 1.1
USED IN HYBRID FIBER-COAX (HFC) NETWORK

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ABSTRACT

Hybrid Fiber Coax (HFC) cable networks have been used in the past primarily to deliver broadcast-quality TV signals to homes. The wide availability of such systems and their extremely wide bandwidth allows extending their functionality to deliver high-speed broadband data signals to end-users. Data over Cable System Interface Specifications (DOCSIS), a MAC protocol elaborated under the leadership of Cable Television Laboratories, Inc., has been established as the major industry standard for two-way communications over HFC cable plants. This thesis develops the Performance Analysis of Cable Modem Network. A worldwide demand for high speed broadband across commercial and residential regions is emerging rapidly due to the increasing reliance on web for information, business, entertainment and new upcoming high bandwidth intensive or real-time applications. Cable modem is a high-speed data device that provides an environment for high-speed digital data access from the Internet over cable television. The cable modem typically has two main connections; one to the cable outlet on the wall and the other connection is to the computer (PC), which has 1,000 times faster in download and upload than the telephone modem connection. The speed of cable modem uploading is a little bit slower than the downloading speed. That makes it sure that the user spends less time waiting for information. The cable modem modulates the digital transmission of data into analog information (uploading) and then demodulates the analog transmission back into digital data (downloading). However, the cable modem translates the digital data into an analog form similar to the way that used in television. The most predominant connection of cable modem is through Ethernet 10Base T that the COM (communications) port on the computer.

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

A hybrid fiber coaxial (HFC) network is a telecommunication technology in which optical fiber cable and coaxial cable are used in different portions of a network to carry broadband content (such as video, data, and voice).

A CATV network is designed and used for cable TV distribution. With an upgrade of the system, it is normally possible to allow signals to flow in both directions. Higher frequencies flow toward the subscriber and the lower frequencies go in the other direction. This is done by upgrades to the amplifiers in the cable distribution network etc. Most CATV networks are Hybrid Fiber-Coax (HFC) networks. It has tree like structure. The single (head end) is the root and the (many) cable modems are at the leaves. The signals run in fiber-optical cables from the Head-End center to locations near the subscriber. At that point the signal is converted to coaxial cables that run to the subscriber premises.

A cable modem is an external device that allows your computer to connect to the Internet through a cable TV wire, instead of a telephone line (or another system). Basically we just connect the Cable Modem to the TV outlet for our cable TV, and the cable operator connects a Cable Modem Termination System (CMTS) in his end (the Head-End). Cable modems translate radio frequency (RF) signals to and from the cable plant into Internet Protocol (IP), the communications protocol spoken by all computers connected to the Internet. Cable modems are designed to take advantage of the broadband cable infrastructure enabling peak connection speeds over 100 times faster than traditional dial-up connections.

Cable modem speeds vary widely, depending on the cable modem system, cable network architecture, and traffic load. In the downstream direction (from the network